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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Hawks Poised

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A SCIENCE SERVICE PUBLICATION

PHYSIOLOGY

Shiver to Keep Warm

➤ SHIVERING is exactly the right thing to do to keep warm.

Those involuntary jerky motions may look foolish but they mean muscles are making heat. In a really vigorous spell of the shivers, the body is producing heat about five times as fast as it usually does.

While the shivers are turning on the heat, so to speak, the blood vessels near the surface of the body are shutting the windows to keep the heat in. They close up, and the outer layers of flesh become a sort of insulation between the vital heat of the inner body and the cold outside.

This is one of the many interesting things about the body's heating system that was brought out by Navy research into what happens when men are in cold water.

If his ship goes down in very cold water the hapless sailor may not last half an hour, despite his body's remarkable defenses against cold.

If the water is 68 degrees Fahrenheit or above, the body can generate enough heat to balance the loss through the surface. The swimmer may last a long time.

If the water is less than 68 degrees, more heat escapes than can be replaced.

In 40-degree water, according to wartime records of ship sinkings, about half of the survivors die within an hour.

Sea water can get as cold as 28 degrees without freezing, because of the salt in solution. In water that cold, few can last half an hour.

Consciousness begins to dim and shivering to stop when the body temperature gets down to 95 degrees. At about 90 degrees consciousness is gone.

But even after the body temperature drops to 77 degrees Fahrenheit, proper treatment can bring survival.

That treatment is to plunge the patient into a tub of water between 110 and 120 degrees Fahrenheit. It is essential to heat that cold layer of outer flesh—which is still guarding a warmer inner body temperature—as rapidly as possible.

The reason is this:

Mild warmth only on the skin may fool the constricted blood vessels into relaxing and allowing the comparatively warm blood within to course through the still very cold outer layer of flesh. When blood thus cooled goes back it may cause a sudden and fatal drop of inner temperature.

The phenomenon is known as "paradoxical cooling" and often brings a tragic ending to what appeared to be a timely rescue.

The survival suit worn by flyers is essentially a tight-fitting waterproof envelope over the clothing. Given warm clothing beneath, this suit can prolong life in the coldest water to as much as four hours.

According to Navy scientists, the body loses heat from two to four times as fast in cold water as in air at the same temperature. You would think the loss would be more rapid, since the thermal conductivity of water—its ability to absorb or lead away heat—is 20 times that of air.

But conductivity is only part of the story. Air moves faster and carries heat away by convection more rapidly than water does. Hence water's net chilling effect, compared to that of air, is somewhat reduced.

Proof of the amazing ability of the body to make heat was given by a Navy experiment in Newfoundland. Ten men jumped overboard in 37-degree water, swam to an inflatable liferaft and climbed aboard. The raft had a hood or cover over it to keep out the cold air.

Packed tightly aboard, the ten men lived for five days without ill effects, though without any degree of comfort. Half took off their clothes and half did not. Those that did not were dry within 24 hours. The others then put their wet clothes back on and soon were dry too.

Without the canvas cover, all would have perished shortly. But with it, the ten bodies built up a temperature of 70 degrees. By then the concentration of carbon dioxide in that closed space was so high that all hands were panting like dogs in midsummer.

They let in fresh air, and that set them to shivering again.

Riding a thin line between freezing and suffocation, they proved that men can survive for a long time in a covered liferaft.

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PSYCHOLOGY

Beat Daily Tensions

➤ PEOPLE are not mentally ill just because they are occasionally tense and anxious, Dr. George S. Stevenson, medical consultant, National Association for Mental Health, Inc., New York, reports in a booklet "How to Deal With Your Tensions."

Everybody is confronted with threats and everybody experiences tensions. The thing to do is to know how to handle them, and here are the 11 ready-to-hand actions he advises for making life more bearable.

When something worries you, talk it out. Talking helps to relieve the strain and puts the worry in a clearer light. Escape for a while is also recommended, not permanently but just until you are in a better emotional condition to deal with the problem.

Work off your anger by doing something constructive, such as gardening, or some other do-it-yourself project. But if you find you are frequently getting into quarrels, maybe you need to give in occasionally. Stand your ground when you know you are right, but do it calmly and remember you could be wrong.

If you worry about yourself all the time, try doing something for somebody else. This takes the steam out of your own worries and gives you a feeling of having done well.

Remember to take one thing at a time because tension sometimes makes the normal work load seem unbearable. Pitch into the most urgent tasks at first and forget the rest. And while you work, shun the "superman urge" that makes you expect too much from yourself. Give it all you have, but do not expect the impossible.

Do not expect too much of other people either, whether they happen to be a wife, a husband or a child. Search out a person's good points and go easy on criticism.

Give the other fellow a break and this will very often make things easier for you. When he stops looking on you as a threat, he stops being a threat to you.

If you have that left-out feeling, make yourself available but do not be too forward. This may lead to real rejection. This is essential for physical and mental health.

The booklets are being offered free of charge on buses, streetcars and subways throughout the country by The Advertising Council.

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MEDICINE

Prison Volunteers Test Vaccine for Tularemia

➤ PRISON VOLUNTEERS at the Ohio State Penitentiary are testing a vaccine developed against tularemia, an infectious disease more commonly known as "rabbit fever" or "deer-fly fever."

The research is aimed at improved methods for the evaluation of vaccines and drugs against a variety of infectious diseases. It is one of the few examples of controlled experimentation in man where the exact method of transmission and amount of infecting organisms are known, Dr. Samuel Saslaw, Ohio State University College of Medicine, Columbus, reported.

The disease in man causes an ulcer at the site of inoculation and enlargement of the lymph glands. It occurs among rabbits, squirrels and other rodents and is transmitted by the bites of flies, ticks, fleas and lice. Man can also get the disease by handling infected animals.

If left untreated the disease can be fatal. However, prompt treatment with streptomycin brought quick recovery to the volunteers who became ill.

The 31 prisoners were honored with certificates of achievement from the U. S. Army for risking serious illness to further medical science's fight against infectious diseases.

The half-finished two-year program is being carried on by the Ohio State University Research Foundation and the Army.

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PUBLIC HEALTH

Far East 'Flu Will Come

Reports of an influenza epidemic in the Far East have alerted doctors and public health officers in the U. S. A number of precautionary measures are being taken.

➤ THERE IS NO way of preventing influenza now rampant in the Far East from popping up in the United States, an advisory committee of physicians and health officers have agreed.

Dr. Leroy E. Burney, surgeon-general of the Public Health Service, has said that "undoubtedly there will be cases and I suspect that there are some now that have been unreported."

The committee he established believes the U. S. can expect a few small, sporadic epidemics this summer, but no large-scale outbreaks. Dr. Burney explained further that approximately 1,000 to 1,800 persons arrive daily by air or ship from the western Pacific and it is difficult if not impossible to keep the new influenza strain from reaching this country.

The new strain is a variant of influenza type A prime and is not included in the usual vaccine now available. It has been estimated that more than 1,000,000 persons have been stricken with the 'flu in the Far East.

This particular strain is considered "mild," and in general has caused a death rate of less than five-tenths of one percent. It has stricken on the average of 18% of the population in each place it has occurred.

Dr. Burney said that if an epidemic reached this proportion in the United States, it would be the worst epidemic since the big influenza killer epidemic of 1918. That outbreak, which hit the U. S. in three waves, affected close to 30% of the population, with an attendant death rate of 1.7%.

The committee recommended the Public Health Service continue its present precautionary steps to detect and fight a possible large-scale outbreak of what has been called "Oriental 'flu."

It was reported that the Department of Defense is considering placing an order with drug manufacturers for 4,000,000 cc of monovalent vaccine, the kind used to treat the new strain. It would take an estimated six to eight weeks to produce this amount. A pilot project has already produced a few thousand cc of the vaccine needed to fight the strain.

The advisory committee did not believe a possible epidemic this summer would be severe, because summer months normally are lowest in influenza incidence in the U. S. The disease is most prevalent in the fall and winter. Whether there will be a severe or mild epidemic of influenza this fall and winter is debatable, the advisory committee concluded.

Bed rest and aspirin are currently being prescribed as a cure for "Oriental 'flu," which lasts some three to four days. Dr. Burney pointed out that the reason influenza had been dreaded in the past was because of the bacterial "hitchhikers," or secondary illnesses such as pneumonia. The chances of secondary illness with antibiotics to combat the bacterial complications are considerably less today.

At present the Public Health Service has no definite policy on advising mass vaccinations for influenza, said Dr. C. C. Dauer of the Influenza Reporting Center. He added that while the vaccines have proved effective in the military the civilian population includes the young who have a stronger reaction to the vaccine than do adults.

All travelers arriving in this country by either plane or ship on the West Coast are being handed influenza warning slips by Public Health Service officials, reports Dr. Calvin B. Spencer, chief of the PHS division of foreign quarantine.

The warning slips are instructing all travelers who become ill within 10 days after their arrival to see a doctor immediately and report to him that they are recent arrivals from outside the country.

The advisory committee will meet again within six to eight weeks to take another look at the situation.

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TECHNOLOGY

Sun Powers Helmet Radios

➤ THE SUN beating down on an infantryman will be the source of energy to power the world's smallest transmitter-receiver built into the soldier's helmet. This is the promise of an experimental helmet radio developed by the U. S. Army Signal Engineering Laboratories, Fort Monmouth, N. J.

The helmet-housed radio has long, narrow clusters of tiny solar cells on either side of the crown. Exposed to sunlight, the tiny solar batteries can get all the power they need to run the radio for as long as a year. Silicon wafers, as the solar cells are called, power the radio for normal daylight operation.

The solar batteries are used in combination with a nickel-cadmium storage cell that takes over in case clouds or nightfall cut off the supply of solar energy. They make up the electrical power packet, which weighs less than a pound.

The four and one-half volts the solar-nickel-cadmium battery produces is raised to the radio's needed 50 volts by an all-transistor power converter housed in the helmet.

Similar devices are now under serious consideration for the walkie-talkie and other light field radios.

Work on the solar conversion of the helmet radio was done in the power engineering branch of the Signal Engineering Laboratories' power sources division, under the direction of George Hunrath. George Uchrin of the same branch designed and built the power converter.

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SUN-POWERED RADIO — The helmet, worn by SP3 David Sturck of Hamden, Conn., contains silicon wafers grouped on each side of the crown which provide all the power necessary for a year's use of the radio.

PUBLIC SAFETY

Danger from Radar

➤ RADAR EQUIPMENT is now becoming so powerful it may present a serious hazard to man, Col. George M. Knauf, U. S. Air Force, Griffis Air Force base, reported to the American Medical Association meeting in New York.

Unfortunately, the Air Force, the principal producer and user of this form of radiation energy, is "practically destitute" in the matter of factual information about its biological effects, he reported.

Until now the power output of the equipment has been too low to be considered a serious hazard, but peak powers as high as 100,000,000 watts can be foreseen.

At present there are three supposedly safe levels of this type of energy. Each is sponsored by a different large producer or user of microwave equipment and, naturally, all of them cannot be right.

To determine what can be considered a safe level, the Air Force has contracts with various university groups to study the effects of the energy on animals and man.

Past research has centered around only the radiation effects on selected organs or systems, and there has never been a good check on its effect upon man's entire body.

It is possible the energy may be causing changes in the body too subtle to show up immediately. These may affect genes and enzymes, Col. Knauf said, or the energy may possibly be releasing free radicals in the body.

Since the results of this research will not be known for some time, safety precautions must be taken now. Monitoring teams have been set up in radar laboratories to make spot checks of the power levels and keep them in the safe range. If radiation in space must be tested, the radiating device is located so that the beam is directed away from any inhabited buildings.

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CHEMISTRY

Low-Grade Gas Made Into High Octane Fuel

➤ A NEW PROCESS for upgrading low octane portions of gasoline by passing them over platinum pellets promises more high octane gasoline per barrel of crude oil.

The process is called hydroisomerization and was developed jointly by Gulf Research and Development Company and Universal Oil Products Company.

Hydroisomerization rearranges the molecules of the low-grade pentane and hexane portions of straight-run gasoline to form the more desirable isopentane and isohexane. The change raises the 88 research octane number of normal pentane to about 106 octane for the isomerized pentane. Hexane's octane number is raised from a low of 65 to a high of over 95. At present, pentane and hexane are added to a refinery's pool of gasoline fractions, increasing the amount of gasoline available, but pulling down the total octane rating, the scientists said.

They added that the increased octane numbers tell only part of the story. The hydroisomerized gasolines will contribute to even better auto performance because they possess superior "road" octane numbers.

Although hydroisomerization has long been possible as a laboratory process, it is only now being applied commercially to gasoline production.

The process, as described by the scientists, consists of passing the low-grade, lightweight liquids rapidly over a bed of platinum in the presence of hydrogen under moderately high pressure. The platinum acts as a catalyst, speeding the reaction without undergoing a change itself.

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PIPEFUL OF PLATINUM — Platinum catalyst is being loaded into a pipe for use in Gulf Oil Corporation's newly developed hydroisomerization process. Behind operator Eugene M. Gatty stands one of the experimental units at Gulf's Harmarville, Pa., research center. The bulk supply of high octane fuel could be increased by possibly 20% as a result of this process.

● RADIO

Saturday, June 29, 1957, 1:45-2:00 p.m., EDT.

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Dr. Igal Talmi, professor of physics, Weizmann Institute, Rehovoth, Israel, will discuss "Within Atomic Hearts."

ENTOMOLOGY

Celebrate Centenary Of Father of Entomology

➤ LEADING entomologists paused on June 11 to recognize the centennial of the birth of Dr. Leland Ossian Howard, chief of the Bureau of Entomology of the U. S. Department of Agriculture for over a quarter of a century.

Dr. Howard's basic work made possible the anti-malaria campaign now being waged world-wide and also the fight against yellow fever.

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METEOROLOGY

Tornadoes Break Records

➤ TORNADOES striking the U. S. the first five months of this year have broken five "all-time" records, the U. S. Weather Bureau reports.

New records have been established for the highest number of twisters during the first four months of any year, 300; during the first five months of any year, 624; during any April, 236; during any May, 324; and during any month of the year, 324.

Undoubtedly, this is a "very severe tornado year," Weather Bureau experts conclude. Even the improved reporting of tornadoes, which grows better every year, they say, would not account for the record-setting year.

They blame persistent weather patterns that have, for instance, brought some rain to Texas for 40 days in a row. The high-flowing broad stream of air known as the westerlies does not circle the earth in a straight line, but instead meanders to form high points and low points known as ridges and troughs.

One trough has remained almost stationary near the Rocky Mountains.

Ahead of this low point in the upper level air is found the warm, moist air from the Gulf of Mexico. Behind the trough is the cold, dry air coming down from Canada and the Arctic. Where these two air masses clash, there are thunderstorms and often squall lines.

Tornadoes are usually embedded in squall lines.

Normally, the planet-wide ridges and troughs of the westerlies move gradually from one position to another. The recent persistence of weather patterns is illustrated, Weather Bureau exports point out, by the fact that almost half of the 300 tornadoes occurring between January and April hit in either Texas or Oklahoma.

Official Weather Bureau records indicate 17 tornadoes struck somewhere in the U. S. in January, five in February, 42 in March, 236 in April and 324 in May. An estimated 125 persons had been killed by twisters through May.

Damage from the storms is reported to amount to $2,505,000 in January, $5,500 in February, $607,000 in March and $17,201,000 in April. Although damage figures for May are not yet available, the May 20 twister that hit Kansas City and demolished 500 homes is certain to have exceeded the total April damage. That one storm alone perhaps cost as much as $75,000,000.

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TECHNOLOGY

Tracker Spots Pop Bottle From Four Miles

➤ AN OPTICAL tracking system so powerful it can photograph an object two inches by seven inches, smaller than the average pop bottle, at an altitude of four miles is now being tested by the Air Research and Development Command, U. S. Air Force.

The six-ton tracker, completely mobile, will be used to photograph the flight history of bombs, aircraft and missiles, recording such information as altitude and spin. Called the TPR for telescopic photographic recorder, the instrument was designed and built by the Perkin-Elmer Corporation, Norwalk, Conn. It is being tested at Eglin Air Force Base, Fla.

Major component of the TPR is a nine-foot-long reflecting telescope, two feet in diameter, equipped with a 70 mm motion picture camera. The tracker can be operated either remotely or by operators.

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MEDICINE

40 Smoking Rabbits Aid Lung Cancer Research

➤ FORTY RABBITS are each smoking a pack of cigarettes per day and enjoying it.

What seems to be fun for the rabbits is a serious study to determine whether smoking can cause lung cancer. Keeper for the 40 smoking rabbits is Dr. Robert H. Holland of the Veterans Administration Hospital in Dallas, Tex., who is trying to find some answers to the lung cancer problem.

Rabbits, Dr. Holland explains, react to certain lung conditions more like humans than do rats, mice or other laboratory animals.

It is estimated that by 1961 the 40 rabbits will have puffed away on 1,600,000 cigarettes.

To do their smoking for science, the rabbits are housed in specially constructed plastic "smoking boxes." The rabbits are put into the boxes for three out of every 24 hours. Once in the box, a lighted cigarette is set exactly two centimeters from the animal's nose.

The animal gets fresh air at all times, but when electric timing devices and solenoid switches close an aperture in the box, the rabbit gets a puff of smoke.

The rabbits are X-rayed every six months and if one dies before the normal five-year life span, the lungs and respiratory tracts are examined and the findings recorded.

Dr. Holland says that strangely enough the rabbits seem to enjoy smoking, particularly the New Zealand Reds.

Some of the cigarettes being used have been impregnated with radioactive arsenic tracers. This is being done to find out whether there might be a relation between arsenic and cancer. Arsenic, used in agricultural sprays, has been thought to have seeped into the earth and then been drawn up into the tobacco plant.

The research, supported by funds from the VA and U. S. Public Health Service, is still in the early stage and no results have been reported.

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OPTICAL TRACKING SYSTEM—The telescopic photographic recorder, or TPR, shown in the photograph is the nation's first completely mobile, high-performance optical tracking system capable of photographing the flight of bombs, aircraft and missiles. The 70 mm motion picture camera is in position mounted on the telescope. It was developed and built by the Perkin-Elmer Corporation, Norwalk, Conn.

GEOPHYSICS

The Earth's Crust

Three phases of the earth's crust will be explored during the IGY: earthquakes, gravity, and latitude and longitude. The U. S. program emphasizes measurements in remote regions.

By ANN EWING

➤ THREE PHASES of the earth's crust will be explored more thoroughly than ever before during the International Geophysical Year, or IGY, beginning officially on July 1.

They are: its earthquakes, or how the planet's surface is continually readjusting; gravity, or how strongly you and every other object is being pulled toward the earth's center; and latitude and longitude, or how far apart are the continents, and are they drifting apart or together.

Most measurements so far made in these fields are concentrated near the world's densely populated regions. During IGY, the United States program will emphasize particularly measurements in usually remote and neglected areas such as Antarctica and the South Pacific.

Although the moon averages about 240,000 miles from the earth, it has more uses than just furnishing light for lovers and creating the ocean's tides. The moon holds a key to learning the distances, within a few feet, between continents.

Measurements by Camera

A new type of camera, developed by Dr. William Markowitz at the U. S. Naval Observatory, can simultaneously photograph the moon and it starry background. It is known as the "dual-rate moon-position" camera, and has a dark, tilting filter that cuts out all but about one-thousandth of the moon's bright light. The movable filter allows photographing at the same time both the stars and the moon clearly.

By taking a series of observations on a single night, the position of the observing station is accurately fixed in relation to star positions and the center of the earth. By using these cameras at some 20 locations around the world, differential shifts between continents can be determined within a few feet, scientists believe.

They call the measurements of "epochal importance" because comparison of results obtained at this time can be made with those taken in the future to determine the directions in which the continents are shifting.

For many problems the general belief that the earth's latitudes and longitudes are precisely known is correct. Mapmakers can draw reasonably accurate maps and navigators can use these maps to pilot ships or aircraft to their destinations with complete confidence. It should be noted, however, that during the last war, some Pacific islands were found to be as much as a mile from their presumed locations.

The IGY moon-measuring program, combined with astronomical determinations of latitude and longitude, will give the pinpoint accuracy needed in the forthcoming era of intercontinental ballistic missiles as well as yield continental shift information.

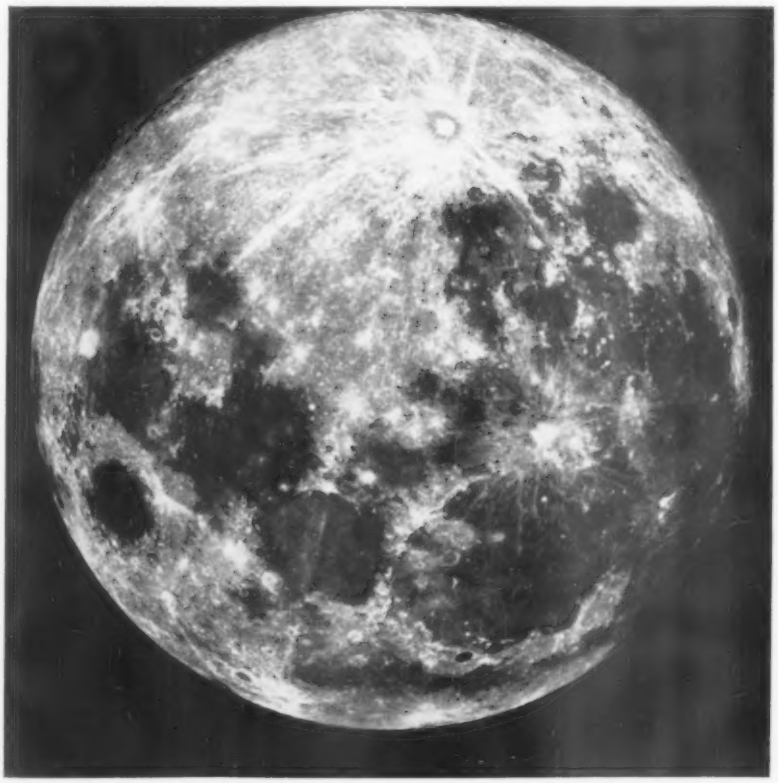
Two Kinds of Time

Another result of extensive observations with the moon-position camera will be a check on what astronomers call Ephemeris Time, which is time measured from the orbital motion of the moon or other heavenly objects. Another kind of time, that given by the rotation of the earth, is called Universal Time and is known to vary because of changes in the earth's rotation rate.

There is a fairly regular yearly variation, the earth running about 35-thousandths of a second fast on Oct. 1 and about equally slow on June 1, when Universal is compared to Ephemeris Time. The reasons for this variation are not entirely known, although it is partly due to tides, shifts within the earth's core and changes in positions of air masses.

However, the earth also undergoes unexplained and irregular changes in rotation. The amount and time of occurrence for these changes cannot be predicted. They are observed by comparing non-uniform Universal Time with Ephemeris Time, the former being 30 seconds slow at present.

By obtaining Ephemeris Time with great accuracy from the 20 moon camera stations, scientists may be able to show the irregular changes in the earth's rotation speed are related to other geophysical events.



MOON, KEY TO CONTINENTAL POSITIONS—By using 20 special instruments, moon cameras developed at the U. S. Naval Observatory, the positions of all continents will be known within a few feet by the end of the International Geophysical Year.

The moon camera will also be used to determine the size and the shape of the earth, and it will be the only such determination based solely on geometry, independent of the pull of gravity.

The U. S. program for measuring gravity has, in effect, already started. While traveling to Antarctica, a team of scientists made basic reference measurements along the way. These references can now be used during IGY to calibrate future measurements in the same regions.

Although the local topography affects the pull of gravity at any particular location, a composite figure, made from measurements all over the earth, is important for many purposes. Only in heavily populated areas have fairly complete gravity measurements been made. The oceans have remained relatively unexplored gravimetrically.

To remedy this, U. S. scientists plan to put their instruments on submarines, then take the gravity readings while the ship lies at rest below the surface disturbances.

Gravity measurements are also being taken in the Arctic on drifting ice floe stations and in the Antarctic.

Measuring the Earth's Crust

A map of the earth's interior is expected to result from the greatly expanded network of stations recording the ceaseless activity of our planet's crust, its earthquakes.

Some of the seismographic recordings will come from man-made explosions, however, particularly in the Antarctic. Surveys of ice thickness along the route between Little America and Byrd Station have already been made. Dynamite charges were exploded periodically, then the time the sound waves took to travel through the ice to the ground and return was measured.

By this technique, ice thickness is measured and a profile of the Antarctic continent obtained. Early measurements indicate that near Byrd Station the ice cover may be 10,000 feet thick. Since the place where these readings were taken is only 5,000 feet above sea level, the underlying land must be 5,000 feet below sea level.

Although most of this is probably due to the particular location, the weight of ice accumulated over many centuries has undoubtedly depressed the continent. This same effect has also been found in Greenland.

Another kind of earth movement, called microseisms and transmitted from the air to earth, will also be studied during IGY.

Of particular interest will be the results of seismic explorations in South America. Scientists want to check a surprising finding made in the United States: the Colorado plateau and Rocky Mountains do not have great roots reaching down some 45 miles, as suggested by their heights. Instead, the continental crust there is hardly different from that of the low lands, being about 18 miles thick.

Thus scientists are faced with the fact that no theory now current can describe a continental structure.

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PHYSIOLOGY

Ear Is a Safety Hazard

➤ NORMAL EARS are making it difficult for jet pilots to fly their high performance aircraft safely, Col. James B. Nuttall, U. S. Air Force, Office of the Surgeon General, Washington, reported to the American Medical Association meeting in New York.

In the early days of aviation, a good sense of balance in the normal ear was considered essential but today the ear presents one of the major safety hazards under certain flight conditions.

A recent study of fatal accidents in one of the Air Force's overseas commands showed 14% were caused by "pilot's vertigo," or spatial disorientation. In some cases pilots became so confused by their normal balance system they were actually flying upside down when they thought they were in level flight.

The normal ear was designed to work on a very stable platform, like the earth, and when it is put in three dimensional space and exposed to different acceleration forces, it sends garbled reports of balance to the brain.

Disorientation comes from both visual illusions and illusions of attitude and motion. The visual illusion experienced by a pilot on a very dark night when there is no moon and only scattered lights on the ground has caused him to mistake the ground lights for stars and the sky for the ground. But these visual illusions are minor compared to those of attitude and motion.

Visual perception is almost perfectly reliable, whereas balance and motion perception by the ear is almost completely unreliable. Reduced visibility and poor weather conditions increase the flying hazards.

Even slight head movements by the pilot can have disastrous results and make him think he is climbing when in reality he is diving toward the ground.

Disorientation is not limited to inexperienced flyers. Even the most experienced pilots report it, but usually they are able to recover if they have enough time.

Since it is impossible to eliminate the cause of this vertigo, Col. Nuttall said, attempts must be made to further reduce its effects.

He suggested improved instrument panel design, so the pilot can more readily scan his dials, and more intensive training of pilots to disregard what their ears tell them and rely on instruments.

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BIOPHYSICS

Object Reproduces Self

➤ SELF-REPRODUCTION, long thought to be a distinguishing characteristic of living organisms, has been discovered among nonliving objects.

Two scientists report that reproduction can be demonstrated by an "exceedingly simple mechanism."

As they explain it in *Nature* (June 8), a flat material such as plywood or vulcanite, is cut into two special shapes, which they call "A" and "B," although other forms could be chosen.

Several of these objects are placed on a track where they can slide freely but cannot pass each other. The track, formed by a shelf or groove, is blocked at both ends and covered by a roof. When the track is shaken up and down, the pieces move but do not link to each other.

If, however, a linked set of "A" and "B" is introduced into the track, and the shaking resumed, the "A-B" complex is reproduced along the track wherever an A-piece happens to be immediately left of a B-piece.

If the experiment is repeated with a set of pieces linked together as a "B-A" complex, the result is to reproduce the figure "B-A" at all possible places along the track.

Dr. L. S. Penrose of University College and Dr. R. Penrose of Bedford College, London, England, devised the self-reproducing model. The difference between the "A-B" and "B-A" complexes corresponds to mutation in that the changed set is repeated in its changed form.

The simple mechanism for reproduction they discovered has been the starting point for construction of more complicated models with similar basic properties.

Science News Letter, June 22, 1957

AERONAUTICS

Missile System Rings American Cities

See Front Cover

➤ A GUIDED missile system has been designed to fill in the gaps of the air defense missile system ringing the nation's cities.

Called HAWK, the new Army set-up is built to knock out low flying attackers. Its guided missile, shown on the cover of this week's SCIENCE NEWS LETTER, is 16 feet long, 14 inches in diameter and powered by a solid-fuel propellant. Hawk's radars are designed to spot enemy craft in the blind zone of conventional radars.

The system will complement the defense against high-altitude attack provided by the Army's Nike system, the Raytheon Manufacturing Company of Waltham, Mass., prime contractor for the missile system, reported.

Science News Letter, June 22, 1957

METEOROLOGY

Radar Pictures Help Predict Flash Floods

➤ FLASH FLOOD conditions can be forecast while the rain is still falling with the help of radar pictures of distant areas, two weathermen told the American Meteorological Society meeting in Monterey, Calif.

Dr. Stuart G. Bigler, A. & M. College of Texas, and Richard D. Tarble, U. S. Weather Bureau, Washington, D. C., and the same Texas college, said the areas of persistent rainfall can be "readily" identified using films of a radar screen.

They reported lack of accurate information about the areas where rain fell and how much poured down, especially in remote headwater regions, has previously hampered forecasting of river levels. Poor communication facilities and inadequate numbers of rain gauges contribute to the problem. Very often, the weathermen pointed out, forecasters were not aware a local storm might produce a flood until river levels started to rise.

Radar pictures can be very useful in identifying areas likely to be flooded while the flood-producing storm is still in progress.

Radar and other modern tools for probing the atmosphere open up the possibility of a new approach to weather forecasting, Dr. Myron G. H. Ligda, also of A. and M. College of Texas, suggested at the meeting.

Instead of treating atmospheric motions in terms of what happens at a given moment at a particular place, the station where the weather record is taken, the new techniques allow weathermen to follow a storm, or a part of it, and how it changes as it moves through the atmosphere, without reference to any fixed point.

This approach, Dr. Ligda said, is "more realistic and natural" than the present method of making atmospheric readings at fixed points and times.

Science News Letter, June 22, 1957

BIOCHEMISTRY

Lung Lining Critically Damaged by Smoking

➤ SMOKERS who have been smoking for 20 years or more have sustained critical damage to the lining of their lungs' bronchi or breathing tubes, scientists at the Washington University School of Medicine reported to the American Association for Cancer Research meeting in Chicago.

Tissue taken from the lungs of heavy smokers was up to 25% thicker than that of nonsmokers, contained many more fast-growing basal cells, showed more lesions or surface furrows, and was infiltrated with a larger number of inflammatory cells, the researchers reported.

After 20 or more years of smoking, whip-like cilia shorten to about one-third their normal length; goblet cells become exhausted and disappear, and protective mucus no longer is produced copiously; cells take on the irregular appearance of cancer cells, and coarse furrows appear in the bronchial lining.

The studies were made on autopsy specimens from 155 men and women over 40 years old. Among those smoking for 30 years or more, women were as vulnerable to the effects as men, indicating that it may be the relative newness of the habit with women, rather than their sex, which has so far protected them from the enormous increase in lung cancer deaths, the report stated.

In those who smoked less than 20 years, the changes, if present, were described as fairly mild.

The damage was found in the bronchi and also in the trachea, the main air passage from the throat to the lungs. The trachea itself is seldom affected by cancer, a fact which has so far escaped understanding.

The long-term study, directed by Dr. E. V. Cowdry and Valentina Suntzeff, was performed by Drs. Brian Spencer, Cardiff, Wales; S. C. Chang of Seoul, Korea; Genshiro Ide, Japan; and Allan J. Rossell and Adele Croninger of the Wernse Cancer Research Laboratory, Washington University School of Medicine, where the work was done.

It was reported by the American Cancer Society, which helped support the research.

Science News Letter, June 22, 1957

MEDICINE

Tube Takes Stomach Pictures in Color

➤ A SNAKE-LIKE tube, three feet long, that takes color pictures inside the stomach, has been perfected by scientists at the University of Michigan, Ann Arbor.

Called the fiberscope, the device is only one-half inch in diameter yet contains 40,000 tiny glass fibers each three feet long. At the base end of the device are a series of mirror reflectors to send the image back up the tube. A tiny electric wire runs down the side of the instrument and carries power to a small floodlight which lights up the stomach.

When refined and mass produced, the fiberscope is expected to be a major tool for private physicians. They will be able to use it in the office to diagnose possible stomach ulcers and cancers, saving many people a short trip to the hospital for more involved diagnosis.

Once inside, the tube can be twisted or bent around in the stomach to observe the duodenum, an area where peptic ulcers frequently occur.

The instrument will eventually replace the currently used lucite gastroscope which is much less flexible, Dr. H. Marvin Pollard, professor of internal medicine at the University, predicted.

The fiberscope was developed by two physicists, Dr. C. Wilbur Peters and L. E. Curtiss, and a physician, Dr. Basil Hirschowitz, former assistant professor of medicine at the University's Medical School.

Science News Letter, June 22, 1957

IN SCIEN

PLANT PATHOLOGY

Speedy Detection Made Of Plant Viruses

➤ PLANT VIRUSES can now be detected within 45 minutes as compared with tests taking as long as three to seven days.

The testing procedure developed by scientists at Pennsylvania State University, University Park, uses a two percent suspension of red blood cells added to a preparation of juice extracts from the leaf tissue of the plant being tested. The juice extract, which can also be made from fruit tissue, is first combined with a phosphate buffer.

The presence of virus infection is indicated by clumping of the red blood cells. The test is so sensitive that, when juices of a supposedly healthy tomato plant were tested and clumping occurred, it was not until one month later that the plant showed definite infection.

The test also indicates the concentration of the virus in the host plant and this amount can be correlated with lesions appearing on the plant.

It is expected the new method for early detection of plant viruses will have great economic importance, considering the millions of dollars in damage caused by virus diseases of tomatoes, potatoes, sugar beets, cherries and other crops.

Dr. John S. Boyle, Dr. James J. Reid and Robert C. Dalzell, a graduate student in the department of bacteriology, developed the testing method.

Science News Letter, June 22, 1957

TECHNOLOGY

Tandem Wheels for Plane Newest Landing Gear

➤ A LANDING gear that permits a 50-ton cargo plane to land safely and on hastily prepared airstrips was described to the American Society of Mechanical Engineers meeting in San Francisco.

Developed for heavy Air Force cargo carriers, the landing gear has two wheels on each side instead of the conventional one wheel. The added wheel is in front of the other wheel, as on a bicycle.

The tandem arrangement, R. O. Dickinson Jr. of the Lockheed Aircraft Corporation, Marietta, Ga., explained, gives greater reliability, a smaller concentration of weight on the runway and a narrower housing when the wheels are retracted.

For cargo carriers with a gross weight of almost 100,000 pounds that may operate from dirt or sand fields, the tandem arrangement permits the second wheel to run in the tightly packed track of the first, thereby reducing friction.

Science News Letter, June 22, 1957

CE FIELDS

MEDICINE

Technique Makes Injection Painless

➤ THE ART of giving completely painless injections with a hypodermic needle has been explained by Dr. Janet Travell, Cornell University Medical College, to the American Medical Association meeting in New York.

Dr. Travell takes exception to the popular notion that the jab of a hypodermic needle must be expected to cause some pain.

She has devised a two step-procedure that eliminates pain and removes the fear of "the needle."

The first step is to spray the skin with a fine stream of coolant that chills but does not freeze the skin. With the skin temperature down to below 10 degrees centigrade the needle is quickly inserted through the skin and into an area of muscle found to have no "deep tenderness."

By avoiding the so-called trigger sites of muscular pain, the pain of the injection is done away with, Dr. Travell explained.

Normal skeletal muscle is completely insensitive to a needle, but with the stresses and strains of usage muscles develop local areas of sensitivity that trigger off pain sensations.

The trick is to miss these with the needle, and a quick manipulation of the area beforehand is all that is needed to find them. The trigger sites are about the size of a fingernail and feel like a washboard to the touch.

The painless procedure can be taught to a person in five minutes and should be standard practice in mass inoculations, Dr. Travell said.

Science News Letter, June 22, 1957

PUBLIC HEALTH

Summer Time Filled With Dangers, Doctors Report

➤ SUMMER and outdoor activities have many good effects on man but also many bad ones, a study of Canadians by Drs. Norman M. Wrong and H. R. Ruttan of the University of Toronto shows.

The bad effects are largely ignored by the average person and by many doctors who should be warning their patients about some of these dangers, they report.

Sunshine is one of the biggest potential hazards and suntans should be acquired with caution.

Too much sunlight produces sunburn immediately, but there are other changes which may not show up for years. The long term effects include aging of the skin and skin cancer, they say.

People should be warned sunbathing in moderation is healthful but sun-baking may be dangerous.

The best preventive of skin cancer is to avoid sunburn at any age. A blonde or red-haired individual with blue eyes should be particularly careful.

Heat exhaustion, another common summer ailment, comes from exposure to excessive heat. It is more common when there has been no period of adaptation. It brings on a gradual weakness and loss of appetite which may progress to mental confusion, Dr. H. W. McIntosh of Vancouver, B. C., reports.

Heat stroke is a far more serious condition and results from a breakdown of the heat-regulating mechanism of the body. It frequently follows heat exhaustion and, without prompt treatment, can result in death.

Medical treatment includes continuous tepid baths or wrapping the victim in a wet sheet and spraying it with cool water.

The doctors reported on the summer hazards in the *Canadian Medical Journal* (May 15).

Science News Letter, June 22, 1957

PHARMACOLOGY

FTC Questions Antibiotic Industry

➤ DETAILED information on how much it costs to produce antibiotics and how much they are bringing on the market has been requested from the 18 manufacturers producing "wonder drugs."

The questionnaires being sent out by the Federal Trade Commission are the second that have been issued. The first were sent out last July by the Commission to check on production, patents and other data relating to antibiotic manufacture.

Among the facts requested by the Commission are those relating to bulk sales of the drugs and their dosage forms for 1956, the pricing policies for antibiotics during that year, and descriptive statements covering the history of the development period, 1943 through 1949.

Much public interest has been aroused about the pricing of modern medicine's wonder drugs and, although the questionnaires are by no means meant to be a policing device, they are designed to give the Federal Trade Commission up-to-date information on the economics of the mushrooming industry.

Since antibiotics represent so high a percentage of all prescription drugs sold today, they have become a fit subject for economic investigation, the Commission believes.

The request for information was developed with the cooperation of antibiotics manufacturers, John W. Gwynne, FTC chairman, emphasized in announcing the new questionnaires.

As rough drafts of the questionnaires were prepared, they were discussed with members of the industry and at the same time FTC investigators visited company plants to study production and research.

Science News Letter, June 22, 1957

TECHNOLOGY

Relay Sends Photo 40 Miles in 3 Minutes

➤ THE ARMY revealed it has a facsimile set that can flash a photograph to a person miles away five minutes after a photographer has clicked the shutter.

The high-speed photo transmitter is foreseen as having both revolutionary military and civilian uses. The set can flash vital military reconnaissance pictures by radio to a command headquarters in time to affect a critical decision. It could also change present methods of photo-reporting by daily newspapers.

Developed by the U. S. Army Signal Engineering Laboratories at Fort Monmouth, N. J., the set needs no darkrooms or messengers. It fits easily into the back of a radio-equipped jeep or car.

Described as the fastest facsimile set in the world, the equipment combines high-speed Army picture-sending techniques with a polaroid film that produces a finished print in one minute. Such a print can then be sent to a receiver 40 miles away, or thousands of miles away over standard telephone lines or long-range radio circuits.

In combat, for example, a front-line soldier with a specially equipped camera can take a picture of important enemy movements and get a three and one-quarter by four and one-quarter inch picture to his commander in five minutes flat.

The set was designed by John Erhart of the Signal Engineering Laboratories' Telecommunication Division and built under the sponsorship of the Signal Corps by the Times Facsimile Corporation, New York.

Science News Letter, June 22, 1957

MEDICINE

Bladder Can Be Grown Around Balloon

➤ HUMANS can grow completely new bladders around a plastic balloon implanted in them, Dr. A. Waite Bohne of the Henry Ford Hospital, Detroit, Mich., reported in an exhibit at the American Medical Association meeting in New York.

The plastic balloons, used in patients who have had their own bladders removed because of cancerous conditions, stimulate the body to grow a covering wall of muscles around the balloon which eventually becomes a new bladder.

The small balloon has three plastic tubes leading from it. Two of these are connected to drain the kidneys and the other passes to the outside of the body.

Seven cases of regenerating bladders have been made possible with the balloons, although a serious drawback in some of the cases has been a back flow of fluid from the bladder to the kidneys. Although plastic valves in the tubes could mechanically prevent this, they would cause a foreign body reaction, and lead to the development of kidney stones, Dr. Bohne explained.

Science News Letter, June 22, 1957

ASTRONOMY

Jupiter and Saturn Rule Skies

Jupiter and Saturn will be brighter than the other visible planets in the July skies while Vega, in the constellation Lyra, will be the brightest star seen at this time.

By JAMES STOKLEY

➤ TWO of the five planets ever visible to the naked eye will be more conspicuous than others on July evenings. Four planets in all can be seen.

Jupiter will be shining brightly in the southwest, in the constellation of Virgo, the virgin. On the scale of brilliance used by the astronomer it will be of magnitude minus 1.4.

Low in the south stands the constellation of Scorpius, the scorpion, the group in which Saturn may be seen. Its magnitude is plus 0.4. This makes it about a fifth as bright as Jupiter.

Both Jupiter and Saturn are shown on the accompanying maps, which depict the sky as it looks about 10:00 p.m. your own kind of standard time (add one hour for daylight saving time) at the first of July, or an hour earlier in the middle of the month. The other two planets that are now visible set before these times, so you will have to look for them quite early in the evening.

Venus, of magnitude minus 3.3, is about six times as bright as Jupiter, but it sets before twilight is completely ended, a little more than an hour after sunset. Look near the horizon in the west, about half an hour after the sun has gone down, and Venus should be clearly visible.

Mars, in the same part of the sky but far fainter, also sets early.

Of the second magnitude it is considerably fainter than Venus, making it much more difficult to locate. However, Venus passes just to the north of Mars on July 11, so that evening they will be close together. Look at Venus with a pair of binoculars; you should see Mars close by.

As for the stars, Vega is the brightest seen on July evenings. This is high in the east, in Lyra, the lyre.

Below it toward the horizon is another first magnitude star, Deneb, in Cygnus, the swan. About as high in the southeast is Altair, in Aquila, the eagle. Since Altair is attended by two fainter stars, one just above and the other below, it can easily be identified.

High in the southwest is Arcturus, in Bootes, the bear-driver. Another way of finding this star is to start with the big dipper, part of Ursa Major, the great bear, in the northwest. The dipper now hangs with the bowl below. The bottom stars are the pointers, Merak and Dubhe, which indicate the direction of Polaris, the pole star, toward the right. But if you go upwards from the bowl of the dipper, and follow the curve made by the stars that form its handle, Alioth, Mizar and Alkaid, they are called, around to the south, it will bring you to Arcturus.

Following it still farther, you reach Spica, in Virgo. Jupiter is in this group, farther to the right.

Finally, among stars of the first magnitude, there is Antares, in Scorpius, where Saturn is now seen. The star is just below the planet Saturn. Since Antares is quite red in color, it is not hard to find.

Lyra Leads the Way

Although it is a relatively small constellation, Lyra, which we can see high in the east on July evenings, has many points of interest. For one thing, it is where we are going!

It is often stated that the earth moves around the sun in an almost circular path, and this is correct. However, the sun itself, and all the planets with it, are moving through space at a speed of about 12 miles per second. Therefore the motion of the earth in space is not really in a circle, but in a helix, what is often—and mistakenly—called a spiral; the same path that one follows climbing a so-called "spiral" staircase. And the direction in which the sun, and the whole solar system, is traveling is toward Lyra.

Star of Distinction

As for Vega, that has several distinctions. It was the first star to be photographed, in 1850, from the Harvard College Observatory, when the recently developed daguerreotype process was applied to astronomy.

Another of Vega's distinctions is that about 12,000 years from now, as it was 14,000 years ago, Vega will be the Pole Star. At that time Polaris, now the pole star, will be as far away from the pole, the point of the sky directly over the north pole around which all the stars seem to revolve once a day, as Vega is now.

This is because of a slow movement of the heavens called "precession of the equinoxes." It is similar to the movement of a top. As the top slows down, it "wobbles," that is, its axis does not stay in one position, pointing upwards, but slowly swings around in a circular movement.

Similarly, the earth wobbles, and, over the course of about 26,000 years, the place towards which our axis points in the northern sky moves around in a large circle. At present, in 1957, it happens to point nearly to the star we call Polaris. About the year 14,000 it will point towards Vega instead.

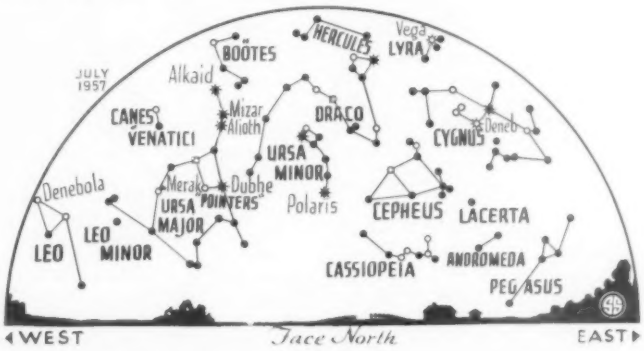
Vega itself is relatively near. It is so distant that its light—traveling 186,000 miles every second—takes about 23 years to reach us. Many stars are hundreds, or even thousands, of light years away.

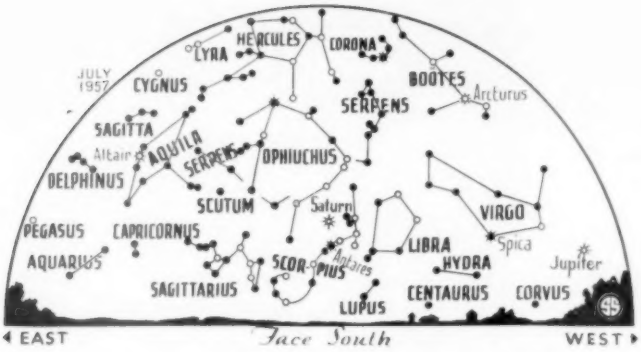
Double-Double Star

Close to Vega, in the general direction of Deneb, the bright star in the nearby constellation of Cygnus, is the star called epsilon Lyrae.

This is rather faint, of the fifth magnitude, which is not far above the faintest that can be seen with the naked eye. But if your eyesight is keen, you will be able to see this is not one, but two stars. If you are unable to see them with the unaided eye, look with a pair of binoculars. Better still is the view through a small telescope. Then each member of the naked eye pair itself is shown to be a pair. Thus, this star is often called the double-double.

Going from Vega towards Altair, you come to two other stars, delta and zeta Lyrae, and a little farther to two more, about as far apart but a little brighter, beta and gamma Lyrae. These four form a little parellelogram. Between beta and gamma there is located the ring nebula of Lyra.





☼ ✱ ○ • SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

This object is visible only through a telescope. A small one, say with a lens three inches in diameter, shows it as an oval patch of light, while a larger instrument reveals it as a ring of nebulosity. This is called the "ring nebula in Lyra," a member of the class of "planetary" nebulae. They were called this in the early days because, through smaller telescopes, they resembled planets.

At the center of the Lyra ring there is a star of the 15th magnitude, visible only through good-sized telescopes. Somehow, the radiations from this star seem to excite the whole nebula to brightness.

But even this does not end the interesting points about Lyra.

The star delta Lyrae, for example, is also shown by a pair of binoculars to be double. And beta Lyrae is a famous variable star. Every 12.9 days it drops from magnitude 3.4 to 4.5. At maximum it is brighter than its neighbor, gamma, but at minimum it is fainter. These changes can be observed with the naked eye.

Thus Lyra, small though it is, offers much of interest to the amateur astronomer.

Celestial Time Table for July

JULY	EST	
2	8:00 p.m.	Earth farthest from sun for 1957, distance 94,452,000 miles
3	5:12 a.m.	Moon passes Jupiter
	midnight	Mercury on far side of sun
4	7:09 a.m.	Moon in first quarter
8	12:14 p.m.	Moon passes Saturn
11	2:00 p.m.	Venus passes Mars
	5:50 p.m.	Full moon
15	10:00 p.m.	Moon farthest from earth, distance 251,900 miles
19	9:17 p.m.	Moon in last quarter
26	11:28 p.m.	New moon
28	5:00 a.m.	Moon nearest earth, distance 223,400 miles
	9:44 a.m.	Moon passes Mars
29	3:02 a.m.	Moon passes Venus
30	6:41 p.m.	Moon passes Jupiter

Subtract one hour for CST, two hours for MST and three for PST.

Science News Letter, June 22, 1957

EDUCATION

U.S. Schools Rival Europe's

➤ AMERICAN colleges and universities have gained enough stature in the past ten years to rival western European institutions as the most sought-after seats of learning.

This is implied in a report issued by the National Science Foundation showing there are now as many foreign students studying in this country as there are foreign students studying in all the universities of Western Europe.

Based on enrollments in 1953-54, the report indicates there are two main reasons for the influx of foreign students to the United States.

"The increase," the Foundation notes, "is indicative of the demand for professional and technical personnel in all parts of the world, as well as the fact that United States institutions of higher learning have achieved internationally recognized status."

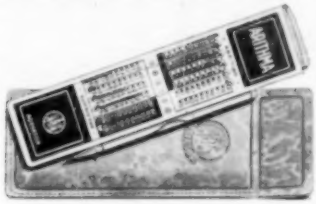
The report, based on surveys made by the Institute of International Education, New York, also shows the majority of U. S. students who now study abroad do so at the graduate level, while the majority of foreign students in this country are studying at the undergraduate level.

Last year, 36,500 foreign students, of whom 13,600 were at the graduate level, were studying in the United States. This is in contrast to the fact that, 30 years ago, western European universities attracted three times as many foreign students as those in the United States.

Based on the 1953-54 enrollment figures, 5,150 foreign graduate students here were taking courses in the fields of natural science and engineering. This number, more than 50% of the total figure, far surpassed the 26% of all American graduate students in the U. S. taking similar programs.

The study was made to complement a report of graduate school enrollment and stipends in the academic year 1953-54 to be published by the Foundation.

Science News Letter, June 22, 1957



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• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N. W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

AVIATION FACTS AND FIGURES 1957—compiled by Rudolf Modley and Edward B. Hincks, edited by Ben S. Lee—*American Aviation Publications*, 120 p., illus., paper, $1.00. A compilation of facts gleaned from hundreds of sources.

BEAUTYWAY: A Navaho Ceremonial—Myth recorded and translated by Father Berard Haile, variant myth recorded by Maud Oakes and sand paintings recorded by Laura A. Armer, Franc J. Newcomb and Maud Oakes, edited with commentaries by Leland C. Wyman—*Pantheon*, Bollingen Series LIII, 218 p., illus., $8.50. Containing beautiful reproductions of the Indian sand paintings and a supplement with the Navaho text of the myth.

BLUEPRINTS FOR BETTER READING: School Programs for Promoting Skill and Interest in Reading—Florence Damon Cleary—*Wilson*, 216 p., $3.00. For teachers and others concerned with the guidance of children's reading.

CLINICAL USE OF RADIOISOTOPES—William H. Beierwaltes, Philip C. Johnson and Arthur J. Solari—*Saunders*, 456 p., illus., $11.50. At the University of Michigan, where two of the authors are on the faculty, every medical student is assigned to the Clinical Radioisotope unit during his junior year. This text is for such students.

THE CLOSING COLLEGE DOOR—*Council for Financial Aid to Education*, 14 p., illus., paper, single copies free upon request direct to publisher, 6 East 45th St., New York 17, N. Y. Facts about higher education and suggestions of what you can do to put your foot in the door and keep it from slamming shut.

THE COAST AND GEODETIC SURVEY: 150 Years of History—A. Joseph Wraight and Elliott B. Roberts—*Govt. Printing Office*, Department of Commerce, 90 p., illus., paper, 35 cents. Telling of the work and history of the first technical bureau of the U. S. Government. In 1807, when Thomas Jefferson was President, Congress authorized him to make a survey of the country's coasts. Ferdinand Hassler, a Swiss scientist, was appointed first Superintendent of the Survey.

DEMOGRAPHIC YEARBOOK 1956: Ethnic and Economic Characteristics—*Statistical Office of the United Nations (Columbia University Press)*, 8th issue, 744 p., $8.50. Special features of this issue are statistics of ethnic composition and population by level of education, age and sex, and number and per cent of population attending school at various ages. In French and English.

EDUCATION DIRECTORY 1956-57: Part 2, Counties and Cities—*Govt. Printing Office*, Office of Education, 96 p., paper, 40 cents. Listing schools and superintendents.

EDUCATION FOR BETTER LIVING: The Role of the School in Community Improvement—*Govt. Printing Office*, Office of Education Bulletin 1956, No. 9, 339 p., illus., paper, $1.50. Discussing what can be done through school to aid in building up underdeveloped communities. The first of a series of yearbooks devoted to Education Around the World.

HOW TO DEAL WITH YOUR TENSIONS—George S. Stevenson—*National Association for Mental Health*, 15 p., illus., paper, single copies free upon request to Better Mental Health, Box 2500, New York 1, N. Y. Tension and anxiety, the author tells us, is natural and useful. Here is useful advice on what to do to prevent too frequent or too serious upsets. (See SNL, p. 386.)

HOW TO FARM YOUR FOREST: A Guide for Woodland Owners in Southern Illinois—Leon S. Minckler and John F. Hosner—*Central States Forest Experiment Station*, Miscellaneous Release No. 11, 68 p., illus., paper, free upon request direct to publisher, P. O. Box 760, Carbondale, Ill. The "left over" land after the better parts are used for crops, is, nevertheless, part of the farm and should be cultivated to bring in an income. This booklet tells how to get income from woodland.

THE INFECTIOUS DISEASES OF DOMESTIC ANIMALS: With Special Reference to Etiology, Diagnosis and Biologic Therapy—William Arthur Hagan and Dorsey William Bruner—*Comstock Publishing Associates*, 3d ed., 968 p., illus., $10.50. Covering not only pathogenic bacteria but also fungi, protozoa and viruses.

INTERLINGUA: Tool of International Communication—Alexander Gode—*Science Service*, 10 p., paper, free upon request direct to publisher, Division of Interlingua, 80 East Eleventh St., New York 3, N. Y. Explaining how this new language was constructed and how it is used. Contains a summary written in Interlingua.

INTERNATIONAL CLOUD ATLAS: Volume II—*World Meteorological Organization (International Publications)*—224 plates, $4.45. A collection of beautiful photographs in black and white and color showing various kinds of clouds and other aspects of the sky. Some are taken from the ground and others from airplanes.

LIBERTY IS ALWAYS UNFINISHED BUSINESS—*American Civil Liberties Union*, 96 p., paper, 50 cents. Annual report of the Union discussing such topics as the freedom of speech and association, academic freedom, and the pressures directed against the printed word, stage and screen and radio-television.

MEPROBAMATE AND OTHER AGENTS USED IN MENTAL DISTURBANCES—James G. Miller and others—*New York Academy of Sciences*, Annals, Volume 67, Art. 10, 224 p., illus., $4.00. Previously unpublished reports on the use of "Miltown" and other new drugs in treatment of various conditions.

MODERN AIRMANSHIP—Neil D. Van Sickle—*Van Nostrand*, 862 p., illus., $9.75. Written for civilian as well as military flyers, this reference book tells the substance of what flyers need to know.

THE NATURE OF CONFLICT: Studies on the Sociological Aspects of International Tensions—International Sociological Association in collaboration with Jessie Bernard, T. H. Pear, Raymond Aron and Robert C. Angell—UNESCO, *(Columbia University Press)*, 314 p., paper, $4.00. Surveys of research on the tensions that lead to war and on the making of peace.

OF SHEEP AND MEN—R. B. Robertson—*Knopf*, 309 p., illus., $5.00. A psychiatrist depicts the isolated life and outlook of the Scottish sheep herder and other characters in a glen near the English border. A delightful book illustrated with photographs taken by the author's wife.

PHYSICS OF NON-DESTRUCTIVE TESTING: With Particular Reference to Some of the New Aspects—H. Kolsky and others—*Institute of Physics*, Supplement No. 6 to British Journal of

Applied Physics, 72 p., illus., $4.00. Intended to enable engineers and others concerned with non-destructive testing to appreciate the importance of new methods based on applications of physics to this field.

PROCEEDINGS OF THE NATIONAL ELECTRONICS CONFERENCE, Volume XII — G. W. Swenson Jr. Chairman—*National Electronics Conference*, 1095 p., illus., $5.00. Besides technical papers on electronics the volume includes discussion of such topics as the Space Satellite Program, Project MURA, and scientific manpower resources of the USSR.

PSYCHOLOGY APPLIED TO LIFE AND WORK—Harry Walker Hepner—*Prentice-Hall*, 3d ed., 639 p., illus., $6.95. Indicating what the science of psychology can teach us about the problems of personality, effective study, employment and other aspects of everyday life.

RADIO OPERATOR'S LICENSE Q & A MANUAL—Milton Kaufman—*Rider*, 6th ed., 720 p., illus., $6.60. To help the would-be "ham" get started.

RADIOACTIVITY AND NUCLEAR PHYSICS—James M. Cork—*Van Nostrand*, 3d ed., 415 p., illus., $5.50. A text for the upper undergraduate or beginning graduate level.

THE REHABILITATION OF SPEECH — Robert West, Merle Ansberry and Anna Carr—*Harper*, 3d ed., 688 p., illus., $7.50. Changes have been made in this text to bring it up to date and to make it more "teachable."

REPORT OF OPERATIONS—E. Finley Carter, director — *Stanford Research Institute*, 10 p., illus., paper, free upon request direct to publisher, Menlo Park, Calif. During the year research was carried out on 760 different projects.

A SECOND (M.K.S.) COURSE OF ELECTRICITY —A. E. E. McKenzie—*Cambridge University Press*, 317 p., illus., $3.50. An English author has prepared this book to enable schools there to convert to the meter-kilogram-second system of measurement in place of the c.g.s. (centimeter-gram-second) system.

THE SOUND OF WINGS: Readings for the Air Age—Joseph B. Roberts and Paul L. Briand, Eds.—*Holt*, 303 p., $5.00. Bringing together the most memorable literature inspired by flying from Ovid's "The Fall of Icarus" and Trowbridge's "Darius Green and His Flying-Machine" to passages inspired by jet flight and the outlook for the future.

STANFORD RESEARCH INSTITUTE — E. Finley Carter, director—*Stanford Research Institute*, 17 p., illus., paper, free upon request direct to publisher, Menlo Park, Calif. Information about the Institute, its background and operation.

STATUTE OF THE INTERNATIONAL ATOMIC ENERGY AGENCY: Hearings Before the Committee on Foreign Relations, United States Senate and Senate Members of the Joint Committee on Atomic Energy—Theodore Francis Green, Chairman—*Senate Committee on Foreign Relations*, 260 p., illus., paper, free upon request direct to publisher, Washington 25, D. C.

TEACHING THE BRIGHT AND GIFTED—Norma E. Cutts and Nicholas Moseley—*Prentice-Hall*, 268 p., illus., $4.25. The "gifted" are defined as "those whose performance in a worth-while type of human endeavor is consistently remarkable," regardless of any arbitrary IQ score set as the criterion.

THE TERPENES: Volume IV, The Triterpenes and Their Derivatives, Hydrocarbons, Alcohols, Hydroxy-aldehydes, Ketones and Hydroxy-Ketones—Sir John Simonsen and W. C. J. Ross—*Cambridge University Press*, 524 p., $13.50. Treating each of these groups of terpenes in detail from the point of view of theoretical chemistry.

Science News Letter, June 22, 1957

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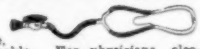

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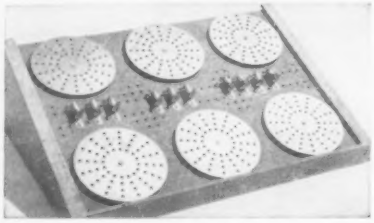

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Questions

ASTRONOMY—How did "planetary" nebulae get their name? p. 395.

☐ ☐ ☐

CHEMISTRY—What precious metal is used in making high octane fuel from low-grade gas? p. 388.

☐ ☐ ☐

GEOPHYSICS—How does the moon camera help astronomers photograph the moon and the stars? p. 390.

☐ ☐ ☐

PLANT PATHOLOGY—How are red blood cells used to test for plant virus? p. 392.

☐ ☐ ☐

TECHNOLOGY—What device makes the sun-powered radio helmet useful when the sun is not shining? p. 387.

☐ ☐ ☐

PHOTOGRAPHS: Cover, Raytheon Manufacturing Co.; p. 387, U. S. Army; p. 388, Gulf Research and Development Co.; p. 389, Perkin-Elmer Corporation; p. 390, Lick Observatory, University of California; p. 400, Deckruss Enterprises.

Do You Know?

Indian medicine men are collaborating with the Public Health Service to promote acceptance of modern medicine among American Indians.

If the *sidewinder* snake does not reach shade or shelter in a matter of minutes, it may die because its body is incapable of adjusting to extreme heat.

A high-quality *protein food* produced locally in Mexico is a mixture of millet and peanut-oil cake, with fish flour added to make up for deficiency of lysine in the vegetable protein.

Gamma rays from radioactive cobalt are being used to detect and control the level of molten titanium in a new "cold hearth" arc furnace.

Distribution for human consumption of salt containing anti-malarial drugs has been suggested to control *malaria*.

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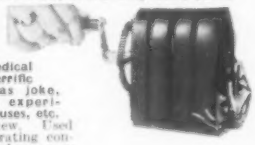

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TRAVEL: GENERAL EXPRESSIONS 33

TRAVEL: GENERAL EXPRESSIONS

SIDE TWO—BAND 1

130. I want to go [to the airline office]. Quiero ir [a la oficina de la línea aérea]. KYAT-ro ee [ah lah o-fee-SEE-nah LEE-nay-ah ah-AY-ray-ah]. day 1.

131. —— to the travel agent's office. a la oficina del agente de viajes. ah lah o-fee-SEE-nah del ah-HEN-ta VYAH-hays.

132. How long does it take to go to Madrid? ¿En cuánto tiempo se llega a Madrid? en KWAHN-toh TYEM-po say YAY-gah DREED?

133. When will we arrive at Barcelona ¿Cuándo llegaremos a Barcelona? KWAHN-doh yay-gah-RAY-mohs LO-nah?

to this the direct way to the P al camino directo al Pra MEE-no dee-RE

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MAGNETIC CHARTS for plotting the course of hurricanes takes in longitudes 61 to 92 and latitudes 14 to 45. The chart is printed in dark blue on a white background, on metal enamel coated on both sides. It is available in two sizes and comes with 18 magnetic markers.

Science News Letter, June 22, 1957

HEATING PAD for boaters is made of vinyl plastic. The pad operates on standard 110 volt dockside electrical systems. The pad is available in two models; one provides a temperature of 115 degrees Fahrenheit on both sides, and the other 115 degrees on one side and 105 degrees on the other.

Science News Letter, June 22, 1957

CARTRIDGE HOLDER keeps ammunition clean and dry. Designed for hunters, match-shooters and hand-loaders, the polyethylene plastic boxes hold shells in individual shock-resistant compartments. The boxes are colored red and can be washed clean.

Science News Letter, June 22, 1957

VENDING MACHINE is built to resemble a rocket space ship. The seven-foot tall machine shown in the photograph dispenses helium or air-filled balloons. The mechanism is generally operated with a coin so that balloons can be made available to tots around the clock. The balloons are dispensed complete with string.

Science News Letter, June 22, 1957

THREAD BOX molded of a clear styrene plastic holds 24 regular-size spools of thread on shelves that tilt forward when the case is opened. A snap lock holds the 4½ by 6 by 2½ inch case firmly shut.

Science News Letter, June 22, 1957

RADIO TRANSCEIVER for the amateur is a portable five-pound unit. Measuring five by five by seven inches, it is designed to operate on any frequency between 50 and 54 megacycles. It can be worked from 115 volts AC or from a six- or 12-volt battery.

Science News Letter, June 22, 1957

DENTURE CUP is the product of a practicing dentist. The plastic cup is an opaque container that holds any set of full or partial dentures in a bath. A hinged lid prevents spilling and finger grips guard against dropping when hands are wet.

Science News Letter, June 22, 1957

FLUID DISPENSER prevents loss or contamination of various liquids. The dispenser can be drop-calibrated for quantitative delivery of milliliter amounts and will deliver one pint or more per minute when fully opened. A safety lock-knob prevents accidental opening.

Science News Letter, June 22, 1957

Nature Ramblings

By HORACE LOFTIN

Bee Language

➤ THE PREVIOUS week had been one of constant rain, but today the warm sun appeared from behind the clouds. On this signal, countless buds erupted into fragrant flower in the rose garden.

Several hundred yards away at the edge of the woods, a bees' nest lay hidden in a great hollow tree. The wet weather had forced the bees into idleness, and now they had to double their efforts in search of nectar. Too many cells stood empty and the grubs were hungry.

Scouts left the hive early, flying off in all directions. One forager wandered farther than the others and she discovered the rich harvest to be gathered in the rose garden. Soon her honey stomach was filled with nectar and she flew back to the hive. At home, her first act was to feed some of her companions with this nectar. Then she began a strange, ceremonious dance on the vertical wall of the comb.

First she moved in a short, straight line, then made a tight semi-circle to the right, next back up the imaginary straight line again and finally a semi-circle to the left. She performed this dance over and over again, and several of her companions walked eagerly behind her through all the steps. Bees near her watched attentively and with great excitement. Finally, her admirers took off on a flight directly toward the rose garden and in a short while were busy collecting nectar from the blossoms.

This is not fantasy. It describes a typical case of how bees can communicate news of a rich find of nectar to their companions.

Unraveling of this "language of the bees" is largely due to the work of a German scientist, Dr. Karl von Frisch, and his colleagues.

By a series of experiments they discovered the direction of the straight line in the bee's dance indicates the direction of the nectar find. Likewise, the slower the dance, the farther away from the hive is the nectar. Finally, the scout who finds the nectar and performs the dance carries the scent of the particular flower. Thus, bees responding to her dance waste no time with flowers bearing another perfume.

This is true language, in the sense that facts are really passed on from bee to bee.

Science News Letter, June 22, 1957